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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/582,982	07/10/2000	KATSUNORI ITOU	49657-742	4615

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EXAMINER
WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 04/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/582,982	ITOU ET AL.	
	Examiner	Art Unit	
	Harry D Wilkins, III	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 2* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 2* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This Office action is in response to the appeal brief filed 12 February 2003. In view of the remarks in the appeal brief the finality of the last Office action is withdrawn.

2. The rejection grounds based on Takata et al in view of Ochi et al, Applicant's admission of prior art and "High Carbon Chromium Bearing Steels" have been changed regarding the maximum carbide size.

3. In addition, new rejection grounds over Adachi et al (JP 06-293939), cited on the International Search Report, are presented below.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Adachi et al (JP 06-293939) Machine Translation with support from Ochi et al (US 5,705,124) (see MPEP 2131.01 III).

Adachi et al anticipate the invention as claimed. Adachi et al teach (see abstract) bearing parts that are made from a high carbon, chromium steel that are used at high temperatures due to their excellent rolling fatigue values. Adachi et al teach (see Table 1) example steel no. 6, which contains 1.01 wt% C, 0.42 wt% Si, 0.39 wt% Mn, 0.012 wt% P, 0.012 wt% S, 1.63 wt% Ni, 2.37 wt% Cr, 0.039 wt% Al, 0.0081 wt% N, 0.0012 wt% Ti, 0.0011 wt% O and the rest Fe. This composition is within the presently claimed

range. Adachi et al teach (see paragraph 34 and Table 2) that the process of treating the steel was to harden at 840°C with an oil quench, followed by tempering at 220°C, which method produces a part that has a hardness of HRC 59.0.

Adachi et al teach that the mean carbide size for example 6 is 0.43 μm, but do not mention the maximum carbide size. However, as the composition of Adachi et al had an identical composition and was treated by an identical process, one of ordinary skill in the art would have considered the steel of Adachi et al to inherently possess a maximum carbide size of less than 8 μm as claimed.

Adachi et al do not expressly teach that the bearing parts are part of an antifriction bearing, however, the bearing parts of Adachi would have been expected by one of ordinary skill in the art to inherently have antifriction properties (a requirement for bearing steels) and, thus, the bearing parts would have been incorporated into an antifriction bearing, which is made from at least three parts, an inner ring, an outer ring and a rolling element (e.g.-roller or ball) as disclosed by Ochi et al at col. 1, lines 5-10.

Regarding claim 2, Adachi et al teach (see paragraph 24) that 0.03-2 wt% V may be added to the steel for creating small carbonitrides (charcoal nitride) and for raising temper-softening resistance.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takata et al (US 4,642,219) in view of Ochi et al (US 5,705,124) and Applicant's admission of prior art, and further in view of "High Carbon Chromium Bearing Steels".

Takata et al teach (see abstract) a bearing steel which contains, by weight, 0.7 to 1.1% C, 0.15 to 1.6% Si, 0.15 to 1.15% Mn, less than 0.010% P, less than 0.002% S, 0.5 to 1.6% Cr, less than 0.015% Al, less than 0.0015% Ti, less than 0.0006% O, less than 0.005% N and the balance iron. The ranges of P, S, Cr, Al, Ti, O and N are within the presently claimed ranges. The ranges of C, Si and Mn overlap the presently claimed ranges. See MPEP 2131.03.

Takata et al do not teach that the bearing steel contains 0.53 to 3.0% Ni.

Ochi et al teaches a bearing steel that is similar in composition to the bearing steel of Takata et al. Ochi et al teach (see col. 5, lines 14-23) that Ni can be added at 0.1 to 2.0% to bearing steels for the purpose of improving the hardenability and extending the life of the bearing steel.

Therefore, it would have been obvious to one of ordinary skill in the art to have added Ni as taught by Ochi et al to the bearing steel of Takata et al because Ochi et al teach that Ni improves hardenability and extends the life of bearing steels.

The claim is directed to a "part" of an antifriction bearing having an inner ring, an outer ring and a rolling element. Takata et al in view of Ochi et al do not expressly teach that the steel is used as a part of an antifriction bearing, however, the bearing steel of Takata et al in view of Ochi et al would have been expected by one of ordinary skill in the art to have antifriction properties and, thus, be made into an antifriction

bearing, which contains an inner ring, an outer ring and a rolling element (e.g.-roller or ball) (for support see Ochi et al at col. 1, lines 5-10).

Takata et al teach (see col. 5, lines 3-9) that the bearing steel is quench hardened and then tempered at 170°C. Thus, Takata et al do not teach that the bearing is tempered at 180 to 350°C.

However, Applicant admits as prior art (see page 2, lines 7-12 of specification) that it was well known in the art to perform a high temperature tempering (300°C) on high temperature use bearing steels that have been quench hardened, such as SUJ2 or the like, or carbonitrided, such as SCM 420 or SNCM 815, in order to attain dimensional stability for use at high temperatures.

"High Carbon Chromium Bearing Steels" at page 1, in Table 2, describes the standard Japanese steel "SUJ2". SUJ2 steel has a composition that is very similar to the composition disclosed by Takata et al and Ochi et al. Thus, one of ordinary skill in the art would have expected the bearing steel of Takata et al in view of Ochi et al to have properties similar to SUJ2 steel.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the bearing steel of Takata et al in a high-temperature bearing because the similar steel SUJ2 had been known to be used in high-temperature bearings and SUJ2 steel and the steel of Takata et al in view of Ochi et al have similar properties. The defects of the prior art SUJ2 high temperature bearing (see page 2, lines 13-16 of specification) were that the bearing had lower hardness, thus producing lower fatigue life and wear

resistance. However, as disclosed by Ochi et al, the Ni improves the hardenability of the alloy, thus, overcoming the problem associated with the prior art.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the conventional processing step of high-temperature tempering after quench hardening or carbonitriding to the bearing steel of Takata et al in view of Ochi et al because the high-temperature tempering aids the bearing in dimensional stability for use at high temperatures.

The claim states "having a structure subjected to tempering after quench hardening or carbonitriding, wherein the hardness after said tempering is at least HRC 58 when tempered at a temperature in a range of 180°C to 350°C and the maximum carbide size is not more than 8 μm". With respect to the property of hardness and maximum carbide size, the alloy composition taught by Takata et al in view of Ochi et al overlaps the alloy composition recited in the claims and the processing method of Takata et al in view of Applicant's admission of prior art and "High Carbon Chromium Bearing Steels" is identical to the process recited in the claims, and, therefore, one of ordinary skill in the art would have expected that the products taught by the references would have the same hardness and maximum carbide size as claimed.

Regarding claim 2, Takata et al teach (see abstract) optionally adding 0.05 to 0.50% Mo and 0.05 to 0.30% V.

Response to Arguments

7. Though new grounds of rejection are presented above, in the interest of furthering the prosecution of this application, the Examiner will respond to the

arguments presented in Applicant's appeal brief. Applicant's arguments filed 12 February 2003 have been fully considered but they are not persuasive. Applicant has argued that:

- The Examiner has failed to factually establish that the steel disclosed by Takata et al is and would have been recognized by one having ordinary skill in the art as designed for high temperature service;
- The Examiner has failed to factually establish that the steel disclosed by Ochi et al is and would have been recognized by one having ordinary skill in the art as designed for high temperature service;
- The Examiner has failed to factually establish that the SUJ2 steel is similar to the steel disclosed by Takata et al;
- The Examiner failed to provide motivation why one having ordinary skill in the art would have recognized that the steels disclosed by Takata et al and Ochi et al could be used at high temepature;
- The steel of Takata et al and SUJ2 are not similar;
- Takata et al teach adding Ni only as an impurity, thus, teaching away from adding it at all;
- As per Samples M, N, O and P in the specification, that when Ni is not added the rolling fatigue life is clearly lower than the inventive examples;
- From the teachings of Ochi et al, one of ordinary skill in the art would not have understood that Ni improves hardness;

- The Examiner committed clear legal error by relying on inherency in an obviousness rejection; and,
- By adding Ni, there is an unexpected result of increased rolling fatigue life and foreign matter rolling life.

In response to Applicant's first and second arguments, the Examiner agrees that Takata et al and Ochi et al do not teach that the bearing steels are designed for high temperature use. However, as admitted by Applicant (see page 2 of specification) SUJ2 steel was used for high temperature service, and when it was applied for such a use, a high temperature treatment was employed. SUJ2 steel (defined in the JIS document) was cited as a comparison alloy in both Takata et al (see paragraph spanning cols. 4 and 5) and Ochi et al (see comparison example 13). As the alloys of Takata et al and Ochi et al are improvements over SUJ2, one of ordinary skill in the art would have expected them to be capable of being applied for the same uses as SUJ2, including high temperature use as claimed.

In response to Applicant's third argument, the following table sets forth a comparison of SUJ2 with the alloys of Takata et al and Ochi et al.

	SUJ2	Takata et al	Ochi et al
C	0.95-1.10 wt%	0.70-1.10 wt%	0.70-1.20 wt%
Si	0.15-0.35 wt%	0.15-1.60 wt%	0.15-1.70 wt%
Mn	0.5 wt% max.	0.15-1.15 wt%	0.15-1.20 wt%
P	0.025 wt% max.	0.010 wt% max.	0.025 wt% max.
S	0.025 wt% max.	0.002 wt% max.	0.001-0.03 wt%

Cr	1.30-1.60 wt%	0.50-1.60 wt%	0.50-2.00 wt%
Ni	0.25 wt% max.	---*	0.10-2.00 wt%

*-Takata et al only includes Ni in Table 1, where it appears to be contained as an impurity. However, there is no disclosure, other than in the Table, that Ni is added or limited in the alloy.

As can be seen from this table, the composition of Takata et al overlaps the ranges of SUJ2 and the ranges of the alloy of Ochi et al either overlap or are slightly broader than the ranges of SUJ2, except for the addition of Ni. While Applicant argues that there are differences, particularly in regard to Cu, Ni and Al, between SUJ2 and the alloys of Takata et al and Ochi et al, it should be noted that at the bottom of the Table, JIS teaches that the alloy may contain up to 0.25 wt% Cu. In addition, since Al is limited to only a maximum in Takata et al and Ochi et al, it is considered to be an undesirable impurity. Such an unavoidable impurity would be present in SUJ2, though at a controlled amount, such as the ranges disclosed by Takata et al and Ochi et al. The similarities in the composition, and particularly the showing in both Takata et al and Ochi et al, provide evidence that the alloys of Takata et al and Ochi et al have properties similar to SUJ2.

In response to Applicant's fourth argument, because, as shown in the previous paragraph, the alloys of Takata et al and Ochi et al have properties similar to SUJ2, and it was known to use SUJ2 for high temperature bearings, one of ordinary skill in the art would have expected the alloys of Takata et al and Ochi et al to be suitable for high temperature bearings.

In response to Applicant's fifth argument, the differences pointed out by Applicant between the composition of Takata et al and SUJ2, particularly Cu, Ni and Al, SUJ2 steel may (see bottom of page 1 of JIS) contain up to 0.25 wt% Cu and up to 0.25 wt% Ni, which leads more credence to the similarity between Takata et al and SUJ2 because Takata et al contains Cu and Ni within these ranges. As for Al, as Takata et al teach (see paragraph spanning cols. 3 and 4) that Al is an undesirable element that affects rolling life, it would be considered an unavoidable impurity that would be reduced to as low a content as possible. Because similar steels (such as SUJ2 and Takata's steel) would have the similar impurities, SUJ2 would necessarily contain an impurity level of Al, thus, there is no difference in Cu, Ni and Al content between the steel of Takata et al and SUJ2.

In response to Applicant's sixth argument, though Takata et al teach in Table 1 that Ni is only included at amounts of 0.10 wt% or less, there is no other teaching regarding the function of Ni. Thus, there is not a negative teaching regarding increasing the Ni above 0.10 wt%. In view of the positive teaching of Ochi et al regarding the effectiveness of Ni, and the lack of a negative teaching against increasing Ni in Takata et al, one of ordinary skill in the art would have been motivated to have added Ni as taught by Ochi et al to the alloy of Takata et al.

In response to Applicant's seventh argument, in regards to the comparison data provided in the specification, the Examiner has considered this data, but has not found it persuasive. Particularly, the effect of Ni was known from Ochi et al to affect hardness and fatigue life, thus, the effects of Ni content displayed in the comparison data were

known in the prior art. In addition, the data in the specification only contains examples and comparisons that are tempered at 350°C, while the scope of the claims includes tempering at 180-350°C. The data showing improved properties is not commensurate in scope with the claimed range of tempering temperature.

In response to Applicant's eighth argument, as Ochi et al teach (see col. 5, lines 15-16) that "Ni is added for the purpose of improving the hardenability of the steel...", it is unclear how one of ordinary skill in the art would not have understood that Ni improves hardness.

In response to Applicant's ninth argument, it has been held that inherency is not improper per se under 35 USC 103 (see In re Pearson 181 USPQ 641 (1974); In re Kalm 154 USPQ 10, 12 (1967)), however as stated in In re Newell (13 USPQ 2d 1248, 1250 (Fed. Cir. 1989)) "...a retrospective view of inherency is not a substitute for some teaching or suggestion which supports the selection and use of the various elements in the particular claimed combination". In the present case, the Examiner has provided a sound basis in fact for combining the teaching of adding Ni as taught by Ochi et al to the alloy of Takata et al, and a sound basis in fact that the new alloy would have been heat treated by methods that had been applied to the similar SUJ2 steel for the known purpose of dimensional stability for use in high temperature bearings. As the properties cited in present claim 1 rely upon the composition and method, and the prior art teaches an identical composition and method, the prior art would necessarily have the hardness and maximum carbide size as claimed.

In respone to Applicant's tenth argument, as Ochi et al teach (see col. 5, lines 15-18) that Ni improves the life of the bearing subjected to rolling fatigue, one of ordinary skill in the art would have *expected* Ni to have this function when added to the alloy of Takata et al. Thus, the comparison data in the present specification showing that by adding Ni the rolling fatigue life is improved does not demonstrate *unexpected* results. "The unexpected results must actually be unexpected." In re Skoll 187 USPQ 481, 484; In re Coleman 205 USPQ 1172.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 6:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Harry D Wilkins, III
Examiner
Art Unit 1742

ROY KING
SUPERVISORY PATENT EXAMINER
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hdw
April 16, 2003